U.S. Department of Veterans Affairs
Public Access Author manuscript
Am J Prev Med. Author manuscript; available in PMC 2021 July 05.

Published in final edited form as:
Am J Prev Med. 2017 April ; 52(4): 491–498. doi:10.1016/j.amepre.2016.12.019.

Impact of Social Determinants of Health on Medical Conditions Among Transgender Veterans

John R. Blosnich, PhD, MPH[1,2], **Mary C. Marsiglio, PhD**[3], **Melissa E. Dichter, PhD**[4], **Shasha Gao, PhD**[1], **Adam J. Gordon, MD, MPH**[1,5,6], **Jillian C. Shipherd, PhD**[7,8,9], **Michael R. Kauth, PhD**[7,10,11,12], **George R. Brown, MD**[13,14], **Michael J. Fine, MD, MSc**[1,5]

[1]Center for Health Equity Research and Promotion, VA Pittsburgh Healthcare System, Pittsburgh, Pennsylvania

[2]Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania

[3]VA Portland Health Care System, Portland, Oregon

[4]Center for Health Equity Research and Promotion, Philadelphia VA Medical Center, Philadelphia, Pennsylvania

[5]Division of General Internal Medicine, School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania

[6]MIRECC, VA Pittsburgh Healthcare System, Pittsburgh, Pennsylvania

[7]LGBT Program Office of Patient Care Services, Department of Veterans Affairs, Washington, District of Columbia

[8]VA Boston Healthcare System, National Center for PTSD, Women's Health Sciences Division, Boston, Massachusetts

[9]Department of Psychiatry, Boston University, Boston, Massachusetts

[10]South Central MIRECC, Michael E. DeBakey VA Medical Center, Houston, Texas

[11]Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, Texas

[12]Houston VA HSR&D Center for Innovations in Quality, Effectiveness and Safety, Houston, Texas

[13]Department of Psychiatry and Behavioral Sciences, East Tennessee State University, Johnson City, Tennessee

[14]Mountain Home VA Medical Center, Mountain Home, Tennessee

Abstract

Address correspondence to: John R. Blosnich, PhD, MPH, Department of Veterans Affairs, VA Pittsburgh Healthcare System, Center for Health Equity Research and Promotion, University Drive C (151C-U), Building 30, Pittsburgh PA 15240-1001. john.blosnich@va.gov.

SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.amepre.2016.12.019.

VA Author Manuscript
VA Author Manuscript
VA Author Manuscript

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Introduction: Transgender individuals experience pronounced disparities in health (e.g., mood disorders, suicide risk) and in the prevalence of social determinants of housing instability, financial strain, and violence. The objectives of this study were to understand the prevalence of social determinants among transgender veterans and assess their associations with medical conditions.

Methods: This project was a records review using administrative data from the U.S. Department of Veterans Affairs databases for 1997–2014. Transgender veterans (N=6,308) were defined as patients with any of four ICD-9 diagnosis codes associated with transgender status. Social determinants were operationalized using ICD-9 codes and Department of Veterans Affairs clinical screens indicating violence, housing instability, or financial strain. Multiple logistic regression was used to assess the associations of social determinants with medical conditions: mood disorder, post-traumatic stress disorder, alcohol abuse disorder, illicit drug abuse disorder, tobacco use disorder, suicidal risk, HIV, and hepatitis C.

Results: After adjusting for sociodemographic variables, housing instability and financial strain were significantly associated with all medical conditions except for HIV, and violence was significantly associated with all medical conditions except for tobacco use disorder and HIV. There was a dose response–like relationship between the increasing number of forms of social determinants being associated with increasing odds for medical conditions.

Conclusions: Social determinants are prevalent factors in transgender patients' lives, exhibiting strong associations with medical conditions. Documenting social determinants in electronic health records can help providers to identify and address these factors in treatment goals.

INTRODUCTION

Social determinants of health, "the conditions in which people are born, grow, live, work, and age,"[1] are crucial for understanding health and health care for marginalized patient populations,[2] and they undergird the social-ecological model, which maintains health and behavior are shaped by the continuous interplay of individual biology and environment.[3] Social determinants are especially salient for transgender individuals, who have high risks for stressors that negatively impact their health, such as homelessness, unemployment, and violence.[4–6] Because social determinants are associated with the development and persistence of mental illness for transgender individuals seeking mental health treatment, clinical practice guidelines emphasize using an ecological approach, such as acknowledging and facilitating open discussion about sociocultural (e.g., discrimination) factors that may interfere with treatment goals.[7]

The Department of Veterans Affairs (VA) is an ideal environment to study the impact of social determinants on the health of vulnerable patient populations. The VA operates the largest integrated healthcare system in the U.S., uses a unified electronic health record (EHR), and is designed as a medical safety net system ensuring access to health care for enrolled veterans nationwide.

Prior research on transgender veterans documented several health disparities. For example, VA veterans with a diagnosis of gender identity disorder experienced suicide-related events at a rate 20-fold higher than the overall enrolled VA veteran population.[8] Compared with non-transgender veterans, transgender veterans have a much greater prevalence of mental

VA Author Manuscript VA Author Manuscript VA Author Manuscript

health diagnoses, including mood disorders and post-traumatic stress disorder (PTSD).[9] Additionally, transgender populations, in general, have high rates of HIV and hepatitis C.[10,11] However, the extent to which social determinants contribute to health problems among transgender individuals is unclear.

The objectives of this project were to understand the prevalence of social determinants among transgender veterans and examine their associations with medical conditions in this vulnerable patient population. The authors aimed to:

1. assess the prevalence of three social determinants (i.e., housing instability, financial strain, and violence) using VA administrative data; and
2. investigate the independent associations of these determinants with medical conditions prevalent among transgender populations (e.g., HIV).

It was hypothesized that each individual social determinant would be independently associated with medical conditions and that an increasing cumulative number of types of social determinants would be associated with an increased prevalence of each medical condition.

METHODS

Study Sample

This project was a secondary analysis of existing VA administrative data. Patient-level information was obtained from VA Medical SAS data sets, which contain administrative data on all veteran healthcare encounters in the VA Healthcare System nationwide.[12] The VA EHR currently includes one field for the sex of the patient, with response options of male and female only; there is no field for gender identity. Veterans are able to change this field with a letter of support from a physician. To identify transgender veterans consistent with previous research,[8,9,13,14] the authors used the following four ICD-9 diagnosis codes indicative of gender identity disorder for all outpatient and inpatient VA encounters from fiscal years 1997–2014:

1. 302.85, gender identity disorder in adolescents or adults;
2. 302.6, gender identity disorder–not otherwise specified;
3. 302.5, trans-sexualism; and
4. 302.3, transvestic fetishism.

The rationale for the selection of these codes has been published previously.[13] Study variables, described below, were extracted for all patients meeting these inclusion criteria. The IRB at the VA Pittsburgh Healthcare System approved this study.

Measures

The authors extracted several patient sociodemographic characteristics. Race was classified as white, black, Native Hawaiian, Asian, or American Indian/Alaska Native, and ethnicity as Hispanic or non-Hispanic. Marital status was married, never married, and formerly married, with the last category including individuals who were separated, divorced, or widowed.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Because enrolled veterans can change their sex designation, the authors relied on the sex designation from their most recent visit, recognizing that this may not reflect the gender identity of the patient. Given the negatively skewed distribution, age was coded into 10-year groupings. Service-connected disability percentage was coded into three categories of no service-connected disability, <50% service connection, and ≥50% service connection.[15]

Prior studies have used ICD-9 codes in VA administrative data to define specific social determinants, including homelessness,[15–17] unemployment,[18,19] and intimate partner violence.[20] Building on this work, the authors identified ICD-9 codes indicative of three categories of social determinants: housing instability, financial strain, and violence (Appendix A, available online, shows list of ICD-9 codes). Data were also identified from responses to VA clinical screening questions related to social determinants. For example, housing instability was defined as a positive screen for veteran housing instability,[21] and a positive screen for military sexual trauma (MST) [22] was included as an indicator of violence. Each category of determinant was coded dichotomously (yes or no) based on the patient ever having one or more indicators used to define each category. A count of the total number of types of social determinants for each individual (zero to three) was also created.

The authors used ICD-9 diagnosis codes to identify eight medical conditions of high prevalence among transgender populations: HIV,[10] hepatitis C,[11] suicidal ideation and attempt,[8] mood disorders,[23,24] alcohol abuse disorder,[25] illicit drug abuse disorder, tobacco use disorder,[26,27] and PTSD.[9] Appendix A (available online) lists ICD-9 diagnosis codes used to operationalize each condition.

Statistical Analysis

Differences in sociodemographic characteristics across social determinants were examined in two ways. First, logistic regression models examined the association of sociodemographic variables with each of the social determinants independently. Second, because >50% of the sample had no stressors, a zero-inflated Poisson regression model with robust SEs was used to assess the association of sociodemographic characteristics with the number of types of social determinants as a count.

To assess how social determinants were associated with medical diagnoses, two multiple logistic regression models were conducted for each medical diagnosis: one model in which social determinants were entered as separate categories and one model in which social determinants were entered as a count of the number of types of social determinants. For instance, the three variables of housing instability, financial strain, and violence were entered into the model simultaneously to obtain their unique associations with mood disorder diagnosis. For the second model, the authors entered determinants as having one, two, or all three determinants (with zero determinants as the reference category) to obtain how the increasing burden of social determinants was associated with mood disorder diagnosis. All models were adjusted for sociodemographic covariates, and AORs or adjusted incident rate ratios are reported. Receiver operating characteristic analyses were conducted to examine the area under the curve as an indicator of the discriminate ability of the logistic regression models.[28] Given the number of tests, statistical significance was defined as $p<0.01$ and 99% CIs are reported for all estimates. All analyses were conducted using Stata/SE, version 13.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

RESULTS

Among the 6,308 identified transgender veterans, 77.3% were white, 29.5% were coded as female at their last visit, and 76.2% were unmarried (46.9% formerly married and 29.3% never married) (Table 1). Overall, 48.1% of the study population had one or more social determinants and 6.5% had three determinants (Table 1 and Appendix Figure 1, available online); the most prevalent of these were financial strain (30.8%) and housing instability (28.3%), which co-occurred in 12.9% of the sample. Nearly one fifth (19.5%) had documentation of violence, including 14.9% who had a positive screen for MST. Detailed frequencies of ICD-9 codes are presented in Appendix A (available online).

Overall, 77.1% of the study population had ever had a diagnosis for a mood disorder, and 40.8% had ever had a diagnosis of PTSD (Table 1). Nearly one in five (17.8%) patients had a suicide-related code. Approximately 26.2% had alcohol dependence, 21.5% had illicit drug dependence, and almost half of the sample had been diagnosed with tobacco use disorder (43.7%). Nearly 3% of the patients had been diagnosed as HIV-positive and 7.5% had a hepatitis C diagnosis.

Black transgender veterans had > 150% increased odds of housing instability (AOR=2.52, 99% CI=1.94, 3.27) and 105% increased odds of financial strain (AOR=2.05, 99% CI=1.59, 2.65) when compared with their white transgender peers (Table 2). Female transgender veterans had lower odds of housing instability and financial strain than male transgender veterans; however, female transgender veterans had more than twice the odds of violence of male transgender veterans (AOR=2.01, 99% CI=1.66, 2.42). Compared with the youngest group of transgender veterans (aged 21–29 years), transgender veterans in the group aged 50–59 years, in particular, had the greatest odds of housing instability, financial strain, and violence. Among findings from the zero-inflated Poisson models were that transgender veterans who were unmarried had greater odds of experiencing all forms of social determinants than transgender veterans who were currently married. Transgender veterans with <50% service-connected disability had fewer total social determinants than transgender veterans without service connection (adjusted incidence rate ratio, 0.81; 99% CI=0.68, 0.97). Lastly, compared with transgender veterans who were married, transgender veterans who were formerly married or never married had greater odds of all of the determinants—both individually and in cumulative number of determinants.

Receiver operating characteristic curve analyses showed that areas under curves ranged from 0.66 to 0.79. After covariate adjustment, housing instability, financial strain, and violence were significantly associated with all medical conditions except for HIV and except for violence with tobacco use disorder (Table 3 and Appendix Figure 2, available online). Among the strongest effect sizes was that transgender veterans who had indications of violence had more than three times the odds of PTSD diagnoses than transgender veterans who did not have indications of violence, even after holding constant financial strain and housing instability (AOR=3.70, 99% CI=3.00, 4.57).

Veterans were categorized based on the number of types of social determinants they had, and for all medical conditions there was a dose response–like relationship between the increasing

VA Author Manuscript VA Author Manuscript VA Author Manuscript

number of types of social determinants being associated with increasing odds for all medical conditions except for HIV (Table 4). For example, compared with transgender veterans with no social stressor indicators, transgender veterans who had one social determinant had nearly three times the odds of suicidal risk (AOR=2.88, 99% CI=2.22, 3.73), transgender veterans who had two social determinants had more than six times the odds of suicidal risk (AOR=6.10, 99% CI=4.67, 7.97), and transgender veterans with all three determinants had > 11 times the odds of suicidal risk (AOR=11.54, 99% CI=8.17, 16.28).

DISCUSSION

The Institute of Medicine issued a report calling for EHR systems to collect information about patients' social determinants,[29] which could assist providers in addressing these factors in treatment goals. To the authors' knowledge, this investigation is among the first to utilize ICD-9 codes in VA administrative data to operationalize three key social determinants among patients, and it is the first study to use EHR to examine the association of social determinants with medical conditions among a transgender population. The findings highlighted consistent dose response–like associations of social determinants with medical conditions, suggesting implications for research to reduce health disparities among transgender veterans and for healthcare systems to collect information about social determinants.

The goal was to examine social determinants and health conditions among transgender patients and not to compare transgender and non-transgender veterans; however, the results indicated prevalence of medical conditions and social determinants that were higher than metrics for the general VA population. For example, there were 26,784 HIV-infected veterans in the VA in 2013,[30] which was approximately 0.5% of VA-utilizing veterans,[31] compared with 2.8% among the present cohort. Because no prior VA studies have defined social determinants as in this study, exact comparisons in a broader veteran population are not possible. However, some of the specific variables that comprised the categories of social determinants illustrate disparities among transgender veterans. For instance, Kimerling et al.[32] found that 2.7% of veterans from Operations Enduring Freedom and Iraqi Freedom screened positive for MST, compared with 14.9% in the present cohort (Appendix A, available online). Although the results reveal compelling information about social determinants and medical conditions among transgender veterans, future studies with a comparison group of non-transgender veterans are needed to examine between-group disparities.

Although literature shows that social determinants, such as housing instability, poverty, and violence, disproportionately affect HIV risk,[33,34] the authors did not find statistically significant associations of social determinants with HIV in this population. One potential reason could be the constitution of the veteran population. Despite the adversities that transgender individuals often face, transgender veterans may have qualities that make them systematically different from transgender non-veterans in terms of HIV risk. For example, as an older population, transgender veterans may transition gender much later in life than transgender non-veterans, which could mean that they are more likely to have social assets in place (e.g., employment, housing they own, spouses, and children) that shielded them

VA Author Manuscript VA Author Manuscript VA Author Manuscript

from HIV risk behaviors (e.g., commercial sex work, injection drug use). Future research is needed to examine how veteran status may moderate social determinants and HIV among transgender populations.

Most information about social determinants among transgender populations comes from self- reported survey research,[26,35] with an exception of a previous study using VA data.[9] Although the validity of using ICD-9 codes as indicators of social determinants is unclear, the patterns of significant findings in the current results suggest these codes may be reliable indicators. This method may provide an alternate, albeit limited, way of identifying social determinants in instances where EHRs do not collect explicit measures of social determinants and could be replicated with other patient populations vulnerable to health disparities (e.g., racial/ethnic minority populations). Additional research is needed to examine how, when, and which providers use specific social determinant–related ICD-9 codes, as well as validation studies to examine concordance between self-report and clinical notation of social determinants.

This study identified important sociodemographic differences, most notably by race. Previous research examining racial/ethnic differences among transgender veterans has shown disparities in medical conditions (e.g., HIV) and social determinants (e.g., incarceration).[25] Black transgender veterans may be a specific population in need of services related to housing and employment, and the VA has targeted programs for these problems, such as housing services [36] and employment rehabilitation.[37] However, several key questions remain unanswered, including to what extent black transgender veterans are referred to and receive these services and, of those who do, what are the outcomes of their participation?

Transgender veterans identified in the medical record as female had higher odds of violence and lower odds of housing instability or financial strain compared with transgender veterans identified as male. Because VA administrative data currently do not ascertain gender identity separately from sex, this study could not assess whether females in the sample may be male-to-female or female-to-male transgender individuals, individuals who may have had sex data changed multiple times in their administrative record, a mistaken entry, or a mixture of these potential scenarios. The authors do note that the percentage of female veterans in this sample (29.5%) is considerably higher than that in Veterans Health Administration in general (9.2%).[38] Despite this uncertainty, literature is concordant that transgender individuals have very high risks of victimization,[5,26] and in this sample, nearly 20% of the patients had a violence-related indicator in their records. The majority of violence indicators were from the MST screen, indicative of historical victimization; the timeframe of the other violence indicators is unclear. Healthcare providers who work with transgender individuals should be aware that historical and current violence in their patients' lives may have insidious effects on health (e.g., missed appointments, noncompliance with treatment). Moreover, interventions for violence may require coordinated care efforts within and outside the healthcare system (e.g., referrals to community services, police involvement).

The present findings underscore the importance of comprehensive care that acknowledges the role of social determinants on individual health. For example, best practice guidelines for

VA Author Manuscript VA Author Manuscript VA Author Manuscript

working with transgender individuals highlight the impact of conceptualizing health concerns within a contextual framework to reduce internalized transphobia.[7] Moreover, the VA issued a national directive[39] outlining the services available to transgender veterans and has implemented training and consultation programs for interdisciplinary teams treating transgender veterans.[40,41] As care delivery and policies develop around transgender health, concomitant research is needed to examine how social determinants may impact transgender patients' access to and utilization of care. Although the present analyses focused on medical diagnoses among transgender veterans, it is likely that social determinants are also implicated with high healthcare utilization, which requires future research with this population.

Limitations

This study has several limitations. First, transgender veterans were identified using ICD-9 codes associated with transgender status, which may result in misclassification of those who may not self-identify as transgender and individuals who do self-identify as transgender but do not have ICD-9 codes documented in their medical records. Consequently, the enumeration of transgender individuals is likely an underestimate of the true prevalence in VA. Second, identifying social determinants using ICD-9 codes also likely resulted in conservative estimates of homelessness, financial strain, and violence. For example, in compiling a composite measure of violence, though the MST screen is universal in VA, the ICD-9 codes associated with injuries from violence are likely underutilized outside of emergency department settings, resulting in an underestimate of those phenomena. Additionally, using ICD indicators for unemployment may not reflect financial strain, as some individuals may receive supplemental income because of disabilities that prevent them from working. Third, the findings from a cohort of transgender veterans who receive health care within the VA may not be generalizable to transgender non-veterans or to transgender veterans not enrolled in VA care. Fourth, using the most current designation of sex from the medical record may not accurately capture gender identity. Fifth, the cross-sectional nature of the analyses prevents any inferences of causality, or examination of the potential bidirectionality, between social determinants and medical conditions. Lastly, VA EHR does not include a category for cohabitation with an unmarried partner, which may have resulted in misclassification of marital status.

CONCLUSIONS

Health is as much a function of social factors as it is of biological factors, and the interactions of these factors are perhaps clearest among the most vulnerable populations, such as transgender veterans. The principles of patient-centered medical homes,[42] which include coordination of care and ways EHR data impact coordination, broaden the concept of healthcare delivery in the U.S. Although individual-level interventions (e.g., psychotherapy, pharmaceuticals) are critical for treating transgender veterans' medical conditions, so too should healthcare systems embrace a public health model of examining how social determinants affect transgender health and healthcare utilization.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

This work was also supported by a locally initiated project award (LIP 72-080) and Career Development Award (CDA 14-408) to John R. Blosnich from the Department of Veterans Affairs, Health Service Research & Development.

The authors thank Maria Mor, PhD at the Center for Health Equity Research and Promotion for her assistance with data management and statistical consultation.

The opinions expressed in this work do not necessarily reflect those of the funders, institutions, the Department of Veterans Affairs, or U.S. Government.

No financial disclosures were reported by the authors of this paper.

REFERENCES

1. Marmot M, Friel S, Bell R, Houweling TAJ, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health. Lancet. 2008;372(9650):1661–1669. 10.1016/S0140-6736(08)61690-6. [PubMed: 18994664]
2. Gottlieb LM, Tirozzi KJ, Manchanda R, Burns AR, Sandel MT. Moving electronic medical records upstream: incorporating social determinants of health. Am J Prev Med. 2015;48(2):215–218. 10.1016/j.amepre.2014.07.009. [PubMed: 25217095]
3. Bronfenbrenner U. Toward an experimental ecology of human development. Am Psychol. 1977;32(7):513–531. 10.1037/0003-066X.32.7.513.
4. Brown GR, Jones KT. Health correlates of criminal justice involvement in 4,793 transgender veterans. LGBT Health. 2015;2(4):297–305. 10.1089/lgbt.2015.0052. [PubMed: 26788770]
5. Stotzer R Violence against transgender people: a review of United States data. Aggress Violent Behav. 2009;14(3):170–179. 10.1016/j.avb.2009.01.006.
6. Lehavot K, Simpson TL, Shipherd JC. Factors associated with suicidality among a national sample of transgender veterans. Suicide Life Threat Behav. 2016;46(5):507–524. 10.1111/sltb.12233. [PubMed: 26878597]
7. ALGBTIC Transgender Committee, Burnes TR, Singh AA, Harper A, et al. American Counseling Association: Competencies for counseling with transgender clients. J LGBT Issues Couns. 2009;4(3/4):135–159. 10.1080/15538605.2010.524839.
8. Blosnich JR, Brown GR, Shipherd JC, Kauth M, Piegari RI, Bossarte RM. Prevalence of Gender Identity Disorder and suicide risk among transgender Veterans utilizing Veterans Health Administration care. Am J Public Health. 2013;103(10):e27–e32. 10.2105/AJPH.2013.301507.
9. Brown GR, Jones KT. Mental health and medical outcome disparities in 5,135 transgender veterans receiving health care in the Veterans Healthcare Administration: a case-control study. LGBT Health. 2016;3 (2):122–131. 10.1089/lgbt.2015.0058. [PubMed: 26674598]
10. Baral SD, Poteat T, Stromdahl S, Wirtz AL, Guadamuz TE, Beyrer C. Worldwide burden of HIV in transgender women: a systematic review and meta-analysis. Lancet Infect Dis. 2013;13(3):214–222. 10.1016/S1473-3099(12)70315-8. [PubMed: 23260128]
11. Porter JC, Lusk HM, Katz AR. Prevalence of HCV infection among clients in community-based health settings in Hawaii, 2002-2010: assessing risk factors. Am J Public Health. 2014;104(8):1534–1539. 10.2105/AJPH.2013.301282. [PubMed: 24028267]
12. VA Information Resource Center (VIReC). VHA medical SAS outpatient datasets and inpatient encounters dataset FY2009: VIReC research user guide. Hines, IL: VIReC; 2011.
13. Blosnich JR, Brown GR, Wojcio S, Jones KT, Bossarte RM. Mortality among Veterans with transgender-related diagnoses in the Veterans Health Administration, FY2000-2009. LGBT Health. 2014;1(4):269–276. 10.1089/lgbt.2014.0050. [PubMed: 26789855]

VA Author Manuscript VA Author Manuscript VA Author Manuscript

14. Kauth M, Shipherd JC, Lindsay J, Blosnich JR, Brown GR, Jones KT. Access to care among transgender Veterans, 2006-2013. Am J Public Health. 2014;104(suppl 4):S532–S534. 10.2105/AJPH.2014.302086. [PubMed: 25100417]
15. Edens EL, Kasprow W, Tsai J, Rosenheck RA. Association of substance use and VA service-connected disability benefits with risk of homelessness among Veterans. Am J Addict. 2011;20(5):412–419. 10.1111/j.1521-0391.2011.00166.x. [PubMed: 21838839]
16. Montgomery AE, Fargo JD, Byrne TH, Kane VR, Culhane DP. Universal screening for homelessness and risk for homelessness in the Veterans Health Administration. Am J Public Health. 2013;103(S2):S210–S211. 10.2105/AJPH.2013.301398. [PubMed: 24148032]
17. Tseng C-L, Sambamoorthi U, Rajan M, et al. Are there gender differences in diabetes care among elderly Medicare enrolled Veterans? J Gen Intern Med. 2006;21(suppl 3):S47–S53. 10.1111/j.1525-1497.2006.00374.x. [PubMed: 16637945]
18. Seal KH, Metzler TJ, Gima KS, et al. Trends and risk factors for mental health diagnoses among Iraq and Afghanistan veterans using VA health care, 2002-2008. Am J Public Health. 2009;99(9):1651–1658. 10.2105/AJPH.2008.150284. [PubMed: 19608954]
19. Sloan KL, Montez-Rath ME, Spiro A III, et al. Development and validation of a psychiatric case-mix system. Med Care. 2006;44(6):568–580. 10.1097/01.mlr.0000215819.76050.a1. [PubMed: 16708006]
20. Dichter ME, True G, Marcus SC, Gerlock AA, Yano EM. Documentation of intimate partner violence in women veterans' medical records: an in-depth analysis. Mil Behav Health. 2013;1(2):114–120. 10.1080/21635781.2013.830063.
21. Montgomery AE, Fargo JD, Kane VR, Culhane DP. Development and validation of an instrument to assess imminent risk of homelessness among veterans. Public Health Rep. 2014;129(5):428–436. [PubMed: 25177054]
22. Kimerling R, Gima K, Smith MW, Street A, Frayne S. The Veterans Health Administration and military sexual trauma. Am J Public Health. 2007;97(12):2160–2166. 10.2105/AJPH.2006.092999. [PubMed: 17971558]
23. Hoshiai M, Matsumoto Y, Sato T, et al. Psychiatric comorbidity among patients with gender identity disorder. Psychiatry Clin Neurosci. 2010;64(5):514–519. 10.1111/j.1440-1819.2010.02118.x. [PubMed: 20727112]
24. Heylens G, Elaut E, Kreukels BP, et al. Psychiatric characteristics in transsexual individuals: multicentre study in four European countries. Br J Psychiatry. 2014;204(2):151–156. 10.1192/bjp.bp.112.121954. [PubMed: 23869030]
25. Brown GR, Jones KT. Racial health disparities in a cohort of 5,135 transgender veterans. J Racial Ethn Health Disparities. 2014;1(4):257–266. 10.1007/s40615-014-0032-4.
26. Grant JM, Mottet LA, Tanis J, Herman JL, Harrison J, Keisling M. National transgender discrimination survey report on health and health care. Washington, DC: National Center for Transgender Equality and the National Gay and Lesbian Task Force, 2010.
27. Conron KJ, Scott G, Stowell GS, Landers SJ. Transgender health in Massachusetts: results from a household probability sample of adults. Am J Public Health. 2011;102(1):118–122. 10.2105/AJPH.2011.300315. [PubMed: 22095354]
28. Steyerberg EW, Vickers AJ, Cook NR, et al. Assessing the performance of prediction models: a framework for some traditional and novel measures. Epidemiology. 2010;21(1):128–138. 10.1097/EDE.0b013e3181c30fb2. [PubMed: 20010215]
29. IOM. Capturing social and behavioral domains in electronic health records: Phase 1. Washington, DC: Institute of Medicine; 2014.
30. Department of Veterans Affairs. HIV infected veterans in VHA care in 2013 with VHA outpatient prescriptions for HIV antiviral medications in 2013 and/or ever had a clinical AIDS OI, for the nation and by state. 2015. www.hiv.va.gov/provider/policy/hiv-in-care-by-state-2013.asp Accessed July 15, 2016.
31. Department of Veterans Affairs, National Center for Veterans Analysis and Statistics. Number of veteran patients by healthcare priority group: FY2000 to FY2014. 2015. www.va.gov/vetdata/Utilization.asp Accessed July 15, 2016.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

32. Kimerling R, Street AE, Pavao J, et al. Military-related sexual trauma among Veterans Health Administration patients returning from Afghanistan and Iraq. Am J Public Health. 2010;100(8):1409–1412. 10.2105/AJPH.2009.171793. [PubMed: 20558808]

33. German D, Latkin CA. Social stability and HIV risk behavior: evaluating the role of accumulated vulnerability. AIDS Behav. 2012;16(1):168–178. 10.1007/s10461-011-9882-5. [PubMed: 21259043]

34. Singer MC, Erickson PI, Badiane L, et al. Syndemics, sex and the city: understanding sexually transmitted diseases in social and cultural context. Soc Sci Med. 2006;63(8):2010–2021. 10.1016/j.socscimed.2006.05.012. [PubMed: 16782250]

35. Shipherd JC, Maguen S, Skidmore WC, Abramovitz SM. Potentially traumatic events in a transgender sample: Frequency and associated symptoms. Traumatology. 2011;17(2):56–67. 10.1177/1534765610395614.

36. Gabrielian S, Yuan AH, Andersen RM, Rubenstein LV, Gelberg L. VA health service utilization for homeless and low-income veterans: a spotlight on the VA Supportive Housing (VASH) Program in Greater Los Angeles. Med Care. 2015;52(5):454–461. 10.1097/MLR.0000000000000112.

37. Twamley EW, Baker DG, Norman SB, Pittman J, Lohr JB, Resnick SG. Veterans Health Administration vocational services for Operation Iraqi Freedom/Operation Enduring Freedom veterans with mental health conditions. J Rehabil Res Dev. 2013;50(5):663–670. 10.1682/JRRD.2012.08.0137. [PubMed: 24013914]

38. Department of Veterans Affairs. Revised women veterans population. 2015. www1.va.gov/WOMENVET/docs/WomenVeteransPopulationFactSheet.pdf. Accessed August 28, 2015.

39. Department of Veterans Affairs, Veterans Health Administration. VHA Directive 2013-003: Providing health care for transgender and intersex Veterans. Washington, DC: Department of Veterans Affairs; 2013.

40. Kauth MR, Shipherd JC, Lindsay JA, Kirsh S, Knapp H, Matza L. Teleconsultation and training of VHA providers on transgender care: implementation of a multisite hub system. Telemed J E Health. 2015;21(12):1012–1018. 10.1089/tmj.2015.0010. [PubMed: 26171641]

41. Mattocks KM, Kauth MR, Sandfort T, Matza AR, Sullivan JC, Shipherd JC. Understanding health-care needs of sexual and gender minority veterans: how targeted research and policy can improve health. LGBT Health. 2014;1(1):50–57. 10.1089/lgbt.2013.0003. [PubMed: 26789509]

42. Stange KC, Nutting PA, Miller WL, et al. Defining and measuring the patient-centered medical home. J Gen Intern Med. 2010;25(6):601–612. 10.1007/s11606-010-1291-3. [PubMed: 20467909]

VA Author Manuscript

VA Author Manuscript

VA Author Manuscript

Table 1.

Sociodemographic Characteristics, Social Stressors, and Medical Conditions Among Transgender Veterans

Variable	*n* (%)
Sociodemographics	
Race	
White	4,879 (77.3)
Black	563 (8.9)
Native Hawaiian	58 (0.9)
Asian	51 (0.8)
American Indian/Alaska Native	115 (1.8)
Ethnicity	
Non-Hispanic	5,286 (83.8)
Hispanic	230 (3.6)
Sex	
Male	4,448 (70.5)
Female	1,860 (29.5)
Marital status	
Married	1,452 (23.0)
Formerly married	2,961 (46.9)
Never married	1,845 (29.3)
Age	
21–29	401 (6.4)
30–39	551 (8.7)
40–49	773 (12.3)
50–59	1,589 (25.2)
60–69	2,141 (33.9)
≥70	852 (13.5)
Service-connected disability	
Not service-connected	3,226 (51.2)
<50%	1,062 (16.8)
≥50%	2,020 (32.0)
Social stressors	
Types of social stressors	
Housing instability	1,788 (28.3)
Financial strain	1,943 (30.8)
Violence	1,229 (19.5)
Number of types of social stressors	
1	1,519 (24.1)
2	1,101 (17.5)
3	413 (6.5)

VA Author Manuscript

VA Author Manuscript

VA Author Manuscript

Variable	*n* (%)
Health conditions	
Mood disorder	4,863 (77.1)
Post-traumatic stress disorder (PTSD)	2,571 (40.8)
Alcohol abuse disorder	1,656 (26.2)
Illicit drug abuse disorder	1,356 (21.5)
Tobacco use disorder	2,759 (43.7)
Suicidal risk	1,122 (17.8)
HIV	175 (2.8)
Hepatitis C (HCV)	471 (7.5)

Note: Percentages may not sum to 100% due to missing data.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Table 2.

Associations of Sociodemographic Characteristics with Social Stressors Among Transgender Veterans

Sociodemographics	Housing instability, AOR (99% CI)	Financial strain, AOR (99% CI)	Violence, AOR (99% CI)	Count of stressors,[a] aIRR (99% CI)
Race				
White	Ref	Ref	Ref	Ref
Black	**2.52 (1.94–3.27)**	**2.05 (1.59–2.65)**	1.32 (0.99–1.77)	**1.42 (1.25–1.60)**
Native Hawaiian	1.85 (0.88–3.89)	0.88 (0.40–1.94)	1.19 (0.53–2.67)	1.11 (0.77–1.61)
Asian	0.73 (0.27–1.97)	0.62 (0.23–1.65)	1.28 (0.53–3.10)	0.95 (0.49–1.84)
American Indian/Alaska Native	1.19 (0.67–2.11)	0.85 (0.48–1.50)	1.29 (0.71–2.32)	0.96 (0.69–1.35)
Ethnicity				
Non-Hispanic	Ref	Ref	Ref	Ref
Hispanic	0.89 (0.57–1.38)	0.92 (0.60–1.41)	1.11 (0.70–1.76)	0.90 (0.72–1.14)
Sex				
Male	Ref	Ref	Ref	Ref
Female	**0.70 (0.59–0.85)**	**0.79 (0.67–0.95)**	**2.01 (1.66–2.42)**	1.10 (0.99–1.22)
Marital status				
Married	Ref	Ref	Ref	Ref
Formerly married	**3.10 (2.41–3.96)**	**2.33 (1.87–2.91)**	**1.38 (1.08–1.77)**	**1.73 (1.46–2.04)**
Never married	**3.08 (2.36–4.03)**	**2.35 (1.84–3.00)**	**1.62 (1.24–2.13)**	**1.76 (1.46–2.11)**
Age				
21–29	Ref	Ref	Ref	Ref
30–39	**2.35 (1.46–3.78)**	**1.68 (1.07–2.65)**	1.37 (0.88–2.15)	1.28 (0.87–1.89)
40–49	**3.09 (1.96–4.88)**	**2.89 (1.88–4.44)**	1.31 (0.84–2.03)	**1.49 (1.04–2.15)**
50–59	**4.62 (3.01–7.10)**	**3.74 (2.50–5.60)**	**1.82 (1.22–2.72)**	**1.56 (1.09–2.24)**
60–69	**2.40 (1.56–3.70)**	**2.49 (1.67–3.72)**	1.22 (0.81–1.82)	1.19 (0.83–1.71)
≥70	0.99 (0.59–1.65)	1.26 (0.79–2.01)	**0.54 (0.32–0.92)**	**0.67 (0.46–0.98)**
Service-connected disability				
Not service-connected	Ref	Ref	Ref	Ref
<50%	0.81 (0.64–1.03)	0.87 (0.70–1.10)	1.01 (0.77–1.34)	**0.81 (0.68–0.97)**

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Sociodemographics	Housing instability, AOR (99% CI)	Financial strain, AOR (99% CI)	Violence, AOR (99% CI)	Count of stressors,[a] aIRR (99% CI)
≥50%	0.87 (0.72–1.05)	1.16 (0.97–1.40)	**2.23 (1.83–2.74)**	0.90 (0.80–1.02)

Note: Boldface indicates statistical significance ($p<0.01$).

[a]Estimated using zero-inflated Poisson regression with robust SEs; the dependent variable of the count of stressors ranges from 0–3.

aIRR=adjusted incident rate ratio

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Table 3.

Associations of Types of Social Stressors with Medical Conditions Among Transgender Veterans

Individual stressors[a]	Mood disorder	PTSD	Alcohol abuse disorder	Illicit drug abuse disorder	Tobacco use disorder	Suicidal risk	HIV	HCV
Housing instability	**2.62 (1.94–3.54)**	**2.00 (1.62–2.48)**	**2.83 (2.29–3.49)**	**3.21 (2.57–4.00)**	**1.76 (1.46–2.14)**	**2.58 (2.04–3.26)**	0.87 (0.51–1.51)	**2.35 (1.66–3.32)**
Financial strain	**3.19 (2.37–4.29)**	**1.52 (1.24–1.86)**	**2.38 (1.94–2.91)**	**2.37 (1.90–2.94)**	**1.64 (1.36–1.97)**	**2.36 (1.89–2.96)**	1.44 (0.85–2.44)	**1.77 (1.26–2.49)**
Violence	**2.60 (1.88–3.59)**	**3.70 (3.00–4.57)**	**1.35 (1.08–1.68)**	**1.49 (1.19–1.88)**	1.18 (0.98–1.43)	**1.91 (1.53–2.38)**	1.64 (0.99–2.71)	**1.46 (1.05–2.02)**

Note: Data are shown as AOR (99% CI). All models adjusted for age, sex, race, ethnicity, marital status, and service-connected disability. Boldface indicates statistical significance ($p<0.01$).

[a]All 3 categories of social stressors were entered simultaneously into each model.

HCV, hepatitis C virus; PTSD, post-traumatic stress disorder.

VA Author Manuscript VA Author Manuscript VA Author Manuscript

Table 4.

Associations of the Number of Types of Social Stressors with Medical Conditions Among Transgender Veterans

Number of stressors[a]	Mood disorder	PTSD	Alcohol abuse disorder	Illicit drug abuse disorder	Tobacco use disorder	Suicidal risk	HIV	HCV
No stressors	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
1 stressor	**3.04 (2.38–3.89)**	**2.33 (1.91–2.85)**	**2.15 (1.72–2.70)**	**2.40 (1.86–3.09)**	**1.68 (1.40–2.01)**	**2.88 (2.22–3.73)**	1.55 (0.88–2.73)	**2.22 (1.47–3.33)**
2 stressors	**6.69 (4.69–9.55)**	**3.81 (3.03–4.80)**	**5.71 (4.50–7.24)**	**6.46 (5.01–8.33)**	**2.68 (2.17–3.31)**	**6.10 (4.67–7.97)**	1.31 (0.71–2.43)	**4.15 (2.80–6.18)**
3 stressors	**44.06 (11.93–162.74)**	**10.84 (7.46–15.75)**	**8.97 (6.42–12.55)**	**11.51 (8.16–16.23)**	**3.12 (2.28–4.27)**	**11.54 (8.17–16.28)**	**2.28 (1.13–4.69)**	**6.11 (3.79–9.85)**

Note: Data are shown as AOR (99% CI). All models adjusted for age, sex, race, ethnicity, marital status, and service-connected disability. Boldface indicates statistical significance ($p<0.01$)

[a]Reference group was veterans with no stressors.

HCV, hepatitis C virus; PTSD, post-traumatic stress disorder.